(Annex)

D2

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 333 531 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.08.2003 Bulletin 2003/32

(51) Int Cl.[7]: **H01R 12/08**, H01R 13/645

(21) Application number: **02002319.8**

(22) Date of filing: **31.01.2002**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

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Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Low height usb interface connecting device and a memory storage apparatus thereof

(57) A connecting device with a low height comprises a connector part, and a set of metal terminals. The connector part has a height compatible with the height of an inner space in a standard USB interface slot socket so as to be inserted into the standard USB interface slot socket. The set of metal terminals is arranged on the connector part and composed of a plurality of metal sheets and each metal sheet has an end disposed in the connector part and another end extending outward the connector part. The first end of the respective metal sheet in the set of metal terminals contacts with internal electronic signal of the standard USB interface slot socket and the second end of the respective metal sheet is soldered to a printed circuit board. Furthermore, the low height connecting device can be revised as an electronic connecting device capable of being inserted into the USB slot socket so that both of the connecting devices can be used in a dual interface memory storage apparatus or a memory storage apparatus.

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Description

BACKGROUND OF THE INVENTION

1. Field of The Invention:

[0001] The present invention relates to a low height USB interface connecting device and a memory storage apparatus thereof.

2. Description of Related Art:

[0002] Currently, a great variety of memory cards are available for electronic products and even if same type products are made from different designs, the memory card in the respective product is different from each other. Although it is so, the various memory cards have a common feature that the digital data in the memory cards can be transmitted to the computer for data processing.

[0003] In order to be capable of reading data in the memory cards, various card readers are provided to adapt different memory cards such as a compact flash card, a SD card, a MMC card and etc. before the data can be processed with the computer. But, the arrangement makes the user inconvenient. Of course, a type of card reader is capable of supporting more specifications of memory cards but it is expensive to give a great financial burden to the user.

[0004] Therefore, as one of computer periphery, how to make the memory card, which is able to improve and reduce using the card reader and is compatible with the computer interface with the existing system hardware for being used with more facility and in accordance with our usual operation practice, is a subject worth us to deeply concern..

SUMMARY OF THE INVENTION

[0005] The USB interface is most widely applied for data transmission between a computer and a card reader among a lot of computer periphery interfaces so that an object of the present invention is to provide a memory card with a function of USB interface card reader, that is, the memory card can be inserted into a USB slot socket to execute a signal change and connection with the computer without the need of a USB interface card reader.

[0006] In order to reach the preceding object, a connector with a low thickness is disclosed first and the connector is compatible with and inserted into a USB slot socket in spite of being not in accordance with the industrial standard for a USB connector. Because various memory cards available provide a very thin thickness respectively, the standard USB interface connector provides a too much high thickness to be built up with a memory card. This is a reason that the standard USB connector is revised in the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention can be more fully understood by reference to the following description and accompanying drawings, in which:

Fig. 1 is a perspective view illustrating a conventional USB connector (left side) and an inserted socket (right side);

Fig. 2 is a perspective view of a low height USB connector according to the present invention;

Fig. 3 is a block diagram of circuit for dual interface memory card device with low height USB connector of the present invention;

Fig. 4 is a perspective view illustrating an embodiment of the dual interface memory card with low height USB connector of the present invention;

Fig. 5 is a perspective view illustrating an embodiment of the USB interface memory card with low height USB connector of the present invention;

Fig. 6 illustrates a disassembled perspective view and an assembled perspective view of a planar electrode contact without USB connector according to the present invention;

Fig. 7 is a system block diagram of a planar electrode contact without USB connector of USB interface memory card according to the present invention;

Fig. 8 is a perspective view of a planar electrode contact without USB connector of USB interface memory card according to the present invention;

Fig. 9 is a system block diagram of a dual interface memory card with a planar electrode contact without USB connector according to the present invention;

Fig. 10 is a lateral sectional view of the dual interface memory card with a planar electrode contact without USB connector of the present invention;

Fig. 11 is a disassembled perspective view of the dual interface memory card of the present invention;

Fig. 12 is a top view of the dual interface memory card of the present invention;

Fig. 13 is a bottom view of the dual interface memory card of the present invention;

Fig. 14 is a perspective view of the dual interface memory card of the present invention illustrating a cover guard being attached to the memory card;

Fig. 15 is a schematic diagram illustrating a framework of interface signal according to the present invention; and

Fig. 16 is a circuit diagram based on the framework of interface signal.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] Referring to Fig. 1, in order to explain the principle of the present invention in detail, a traditional USB interface connector is described first. It can be seen in Fig. 1 that a plug of the connector end is at the left side and a slot socket of the host end is at the right side. Wherein, the reference numbers 104A and 104B are designated as a casing of the plug and a casing of the slot socket for shielding electronic signals.

[0009] Referring to Fig. 2, a USB low height connector 100 according to the present invention comprises a metal terminal 101, two jut pieces 102 and a connector part 103. The metal terminal 101 is composed of a plurality of metal sheets, which are the same as the metal sheets in the standard USB interface connector regardless in number, distance and size. The connector part 103 is different from the standard USB interface connector in that at both lateral sides of the connector part 103 are fixedly attached with the jut pieces 102 respectively or integrally extend the jut pieces 102 respectively. The connector part 103 is provided with a thickness same as the height of the inner space in the standard USB interface slot socket ("h" in Fig.1) such that the connector part 103 can be inserted into the slot socket so as to transmit the signal. The respective jut piece 102 is used for preventing an incorrect signal connection resulting from the connector part 103 being inserted into the slot socket inversely so that the entire connector has a height much lower than the height of the standard USB connector. Besides, the connector part 103 can provide an external recess (102A in Fig.2) to reinforce an engaging strength thereof during being inserted into the standard USB interface, like standard USB connector, and the connector 100 can be associated with a print circuit board 201 by way of soldering directly such that a state of close circuit can be obtained.

[0010] Comparing to Fig. 1, it can be seen in Fig. 2 that the connector 100 of the present invention does not provide the casing 104A shown in Fig. 1 so that the thickness of the connector 100 can be reduced greatly. Originally, the casing 104A is provided for shielding and decreasing an effect of signal delay generating from the USB cable, Because the connector 100 is located on the memory card, no traditional USB cable is needed, the casing, which has the function for insulating the shielding signal, can be removed from the connector part 103 of the present invention. Hence, the USB interface connector can be flattened and the USB interface product can be developed toward a trend of card shaped type. A further explanation will be described hereinafter.

[0011] Referring to Fig. 3, a block diagram of circuit in the dual interface memory card device disclosed in the present invention is illustrated. It can be seen that the memory card has two digital data transmission interfaces, an application system interface and a USB interface. The data is saved in an internal memory 160 after the data is transmitted to the memory card from the applied system via the system connector 150. Once the memory card is taken out from the applied system, the previous designed USB low height connector 100 can be used for connecting with the USB interface of the computer main unit. That is, as soon as the memory card is inserted into the USB slot socket of the computer, the data is possible to transmit to the computer main unit without via the USB lead wire and the USB interface card reader. Wherein, a dual interface controller 140 provides a function of related applied system interfaces changing to the USB interface.

[0012] Referring to Fig. 4, one of typical examples of the dual interface memory card according to the present invention in practice is illustrated. It can be seen that a memory card 70 attached with a cover guard 71 provides the same size as an ordinary memory card capable of being used in an applied system. In case of the memory card 70 being taken out from the system, the exposed connector 72 can be inserted into the USB interface slot socket as long as the cover guard 71 is detached. It is pretty convenient while in use.

[0013] Accordingly, the preceding low height connector can be utilized to guide the USB signal to and to write data into the memory card directly and vice versa. In this way, a memory card with two different interface connectors is completed. Meanwhile, a read only switch 73 and a signal light 75 is placed at the external part of the memory card for data security. When the switch 73 is shifted to the read only mode, the memory card only offers a function of data read so that it is not possible to write the data into the memory card. Once the switch 73 is shifted to the normal mode, the memory card can be used normally with a function of read and write and the signal light 75 is used to indicate the working status of the USB device.

[0014] In order to simplify the entire system further and the application system interface being deleted, the USB interface system can be remained unchanged and the low height connector can be made as a super thin USB interface memory card as shown in Fig. 5. It can be seen that the USB interface memory card shown in Fig. 5 is provided with a lighter, thinner, shorter and smaller size in contrast to a memory device with current standard USB interface connector. It means the traditional USB interface memory device can be flattened in shape by way of the technique disclosed in the present

invention so that it can be an innovative product design.

[0015] Referring to Fig. 2 again, the signal may enter the memory storage apparatus after passing through the metal terminal 101 of the connector 100 by way of the terminal 101 being soldered to metal conductive pads of the printed circuit board 201. It is known that soldered joints on the circuit may result in a change of impedance of transmission line to influence the high-speed transmission for data. Hence, how to remove the soldered joints is another object of the present invention. A way to eliminate the soldered joints can be done by way of the signal touching the metal conductive pieces of the printed circuit board in the memory storage apparatus via the USB terminal of the main unit instead of using a connector. This is a design concept of so-called golden finger recognized by the makers, that is, the direct contact is used instead of the connector for circuit connection to enhance the electronic feature of the memory storage apparatus during performing high-speed transmission.

[0016] Referring to Fig. 6, a principle of design with no connector is illustrated further. A planar electrode contact without USB connector 110 with a USB contact end is shown in Fig. 6 and the entire height of the connector 110 can be received in the USB slot socket of the main unit after a printed circuit board 202 being associated with a base 113 and the fool proof jut piece 112 is integral with the casing 114 and disposed at two opposite lateral sides of the printed circuit board 202. The metal connective pieces 111 laid out on the printed circuit board 202 are utilized to replace the metal terminal 101 shown in Fig. 2. Hence, once the preceding connector is assembled, it provides a function same as the connector shown in Fig. 2 so that the planar electrode contact 110 can be used instead of the traditional USB connector and deficiency generated from the soldered joints on the circuit can be eliminated completely. In addition, the process for setting up the product during production operation can be simplified substantially. Besides, the base 113 can also provide an external recess (112A in Fig.13) to reinforce an engaging strength thereof during being inserted into the standard USB interface, like standard USB connector.

[0017] Referring to Fig. 7, a system block diagram of the USB memory card system according to the present invention is illustrated. The system 500 comprises a printed circuit board with USB gold contacts 501, a USB controller 502 and a memory components array 503. As the foregoing, the signal in the storage apparatus dose not pass through the connector and the soldered joints any more and connects with USB metal terminal of the host connector to form a close circuit.

[0018] Referring to Fig. 8, a USB interface data storage apparatus with a USB interface planar electrode contact, which is disclosed in the present invention, is illustrated. The thickness of the memory storage apparatus shown in Fig. 8 has greatly reduced and it effectively enhances the portability with more facility. The planar electrode contact without USB connector 300A is formed by way of the same principle of design as shown in Fig. 6. A signal light 114A is arranged on the memory card for indicating the working status of the storage apparatus. A read only switch 202C is provided to prevent the data from being covered or deleted accidentally so that the security for data can be enhanced effectively.

[0019] From the preceding method, a new USB storage apparatus is disclosed further and the new USB memory storage apparatus not only provides a much lower height than that used in the conventional USB connector but also does not need the connector to reduce extra soldered joints.

[0020] Furthermore, the USB interface planar electrode contact disclosed in the present invention can be mounted to various currently used memory storage apparatus to lower down the height of the standard USB connector part such that it is capable of being developed a novel storage apparatus with two different interface connectors. The novel storage apparatus with two different connectors will be described further hereinafter. Referring to Fig. 9, a system block diagram for a memory storage apparatus with the preceding USB interface connector such as a memory stick card, a SD card, etc. and with an application system. Wherein, the system 500A comprises a preceding USB planar electrode contact 504, a connector 505 for a conventional application system, a controller 506 with dual interface signal switch for changing data to USB signal and application interface signal and a group of memory array 507.

[0021] In order to explain a real design of the block diagram illustrated in Fig. 9, the memory stick card is taken as an example for the system design and the design method disclosed hereinafter also can be applied to other memory storage apparatus as long as a framework can be arranged properly. Referring to Fig. 10, it can be seen from the sectional view of the memory stick card that there is a USB signal contact end 300 provided for reading and writing USB signal and there is an interface end 400 of the memory stick card (application system) provided with different specifications depending on different memory cards. That is, the memory storage apparatus is capable of having two different interface ends, a USB interface end and an application interface end, wherein, the USB interface end acts as an interface for being connected to the host end signal and the application interface end such as MMC, SD, ..., and etc. for connecting signal between the device and the application system.

[0022] When the memory storage apparatus shown in Fig. 10 has performed the job thereof in the application system of the memory stick card and is taken out from the system, a USB interface connector 300 at another end thereof can send data to the computer via the USB interface. The USB interface connector 300 can be inserted into host USB slot socket so that it is not necessary to carry out the data transmission via a card reader. A printed circuit board 202 on the surface thereof

bears circuit components 202A and the casings 114 and 113A enclose the printed circuit board 202. Gold contacts 111, 111A are arranged on the printed circuit board 202 and form as a USB contact conductor and a contact conductor of the memory stick card.

[0023] It is summarized from the preceding description that the present invention discloses how to reduce the height of the USB connector in Fig. 2 for being capable of applying to the existing memory card and further discloses how to remove the connector for decreasing the number of soldered joints on the circuit and enhancing the performance of the circuit with a moderate reluctance under high speed signal transmission.

[0024] Referring to Fig. 11, it can be seen from the disassembled perspective view that the memory storage apparatus, for instance, the memory stick card, provides a printed circuit board 202 and two casings 114 and 113A. It is learned from the block diagram in Fig. 9 and the disassembled perspective view that the USB interface connector is not included in the memory storage apparatus of the present invention any more, and a signal light 114A can be fixedly attached to the casing 114 to indicate the work status of the memory storage apparatus as the preceding embodiment does. In addition, a read only switch 202B is arranged on the memory storage apparatus to prevent the data from being written, covered or deleted in case of the read only switch 202B being shifted to a proper mode. Referring to Figs. 12 and 13, it can be learned from the top view and the bottom view of the memory storage apparatus that two different interface contacts 300, 400 are provided and the interface contact 300 is a USB interface contact arranged on the memory card in accordance with the design way disclosed in the present invention so that it allows the memory card to keep the feature of low height. Further, a cover guard can be added to protect parts of the USB contact. Fig. 14 shows a movable cover guard 301, which may be detachable or fixedly attached to connector.

[0025] As the foregoing, if the interface at the application system end is removed and the USB interface remains unchanged, a memory storage apparatus with USB interface only can be formed. Comparing to a memory storage apparatus with conventional USB interface, the memory storage apparatus according to the present invention is much thinner, lighter shorter and smaller in size for being carried about easily. Therefore, it is hardly said the present invention is not a novel, creative and advanced invention.

[0026] The planar electrode contact USB connecting device disclosed in the present invention provides no connector and has to satisfy portability especially in practice so that it is necessary to consider a time difference between the work status of the interface controller and the work status displayed by the system, that is, it is possible to cause a time difference between the work status displayed by the system and the work status of the real device. This is a point has to be confirmed strictly for the design of detachably portable device, otherwise, it is very likely to mislead the user due to individual different system design such that the device is detached accidentally before completing the job thereof to result in the data in device being damaged.

[0027] However, the standard USB interface signal is not sufficient to offer a solution so that a new interface signal is designed in the present invention to solve the preceding problem thoroughly. Referring to Fig. 15, an interface signal framework 508 (corresponding to the circuit board 202 in Fig. 6) comprises a power supply (V_{bus}) for offering a working voltage, a signal group including a D+ and a D-signals, a ground signal (power GND) to constitute a standard USB interface signal group. The difference of the present invention from the conventional USB interface signal is that an apparatus work signal group is provided additionally. The work signal group supplies a work signal for indicating the work status of the apparatus and the D+ and D- signals are data signals in accordance with the specification of the standard USB interface. The apparatus work signal group is supplied by the apparatus end connects with the controller of the apparatus end by way of a necessary circuit.

[0028] Wherein, the power supply (V_{bus}) can support 5 volts, 3.3 volts, 2.5 volts and 1.8 volts so that it is possible for the power supply to offer a working voltage in different specifications. The apparatus working signal group includes a work signal W/R and a power providing signal P. In case of the device being designed as a memory storage apparatus such as the USB memory card, the work signal W/R indicates if there is any data being transmitted on the interface (read/write). In case of the device being input/out apparatus such as a USB network card, the work signal W/R indicates if there is any data being transmitted on the interface (upload/download).

[0029] Referring to Fig. 16, a circuit diagram with an interface signal framework is illustrated. The W/R work signal is supplied by an interface controller 509 and as soon as the data is transmitted on the USB interface, a signal light such as LED arranged at the external part of the device can be triggered via the W/R signal. Hence, the user can confirm the actual work status of the interface controller through an external signal light 114C to prevent the device from being removed from the system accidentally.

[0030] When the device is used for the standard USB interface slot socket, the standard USB interface does not support W/R signal so that the device itself has to have a data signal light. Meanwhile, the W/R signal can trigger a signal light 114A arranged in the device. By the same token, the power providing signal P provides the same principle of being actuated. Referring to Fig. 16 again, as soon as the USB interface is inserted, the interface controller 509 can offer a power providing signal P to trigger a signal light 114D arranged on the host. The signal light 114D is used for indicating if the device is in

a state of electricity consuming work or in a state of electricity consuming alert. Similarly, the providing signal P can also trigger the power signal light 114B arranged in the device.

[0031] While the invention has been described with reference to a preferred embodiment thereof, it is to be understood that modifications or variations may be easily made without departing from the spirit of this invention, which is defined in the appended claims.

Claims

1. A connecting device with a low height, comprises

   a connector part, having a height thereof compatible with a height of an inner space in a standard USB interface slot socket so as to be inserted into the standard USB interface slot socket; and
   a set of metal terminals, being arranged on the connector part, being composed of a plurality of metal sheets, each of the metal sheets having a first end being disposed in the connector part and a second end extending outward the connector part;
   whereby, the first end of the respective metal sheet in the metal terminal assembly contacts with internal electronic signal of the standard USB interface slot socket and the respective second end is soldered to a printed circuit board or a signal connecting lines as a soldered joint such that a circuit loop can be formed.

2. The connecting device with a low height according to claim 1, wherein a set of jut pieces are fixedly attached to both lateral sides of the connector part for preventing the connecting device from being inserted into the slot socket in an incorrect direction.

3. The connecting device with a low height according to claim 1, wherein the metal terminal assembly provides four independent and disconnecting gold contacts for connecting with the electronic signal.

4. The connecting device with a low height according to claim 1, wherein the connector part provides an external recess to reinforce an engaging strength thereof during being inserted into the standard USB interface.

5. A low height USB interface memory storage apparatus, comprising:

   a casing, receiving and bearing following components;
   a printed circuit board, being arranged in the casing, providing a layout of lead wire circuit;
   a memory array, at least comprising a memory component as a data storage apparatus;
   a controller, being disposed in the casing, being provided with a layout of required circuit for completing transmission and change between USB interface signal and data signal and performing data saving into the memory array; and
   an interface connector, being different from the standard USB interface connector but capable of being inserted into a USB slot socket, exposing outward the casing, providing a soldering joint to connect with the printed circuit board.

6. The storage apparatus according claim 5, wherein the interface connector is the same as the low height connecting device defined in claim 1.

7. The storage apparatus according claim 5, wherein the memory component is provided with a read only switch or device exposing externally.

8. The storage apparatus according claim 5, wherein a signal light is mounted externally.

9. The storage apparatus according claim 5, wherein a detachable cover guard is provided to fit with and protect the connector.

10. A memory storage apparatus with dual interface connecting devices, comprising

    a casing, receiving and bearing following components;
    a printed circuit board, being disposed in the casing and having a circuit layout of lead wires;
    a memory array, at least comprising a memory component and acting as data saving device;
    a dual interface controller, changing data saved in an internal memory of being disposed in the housing, being provided with a required circuit for completing an interface signal change and transmitting data between an interface and the memory component;
    a system interface connecting device, exposing outward the casing, providing wires to connect with the printed circuit board, having an external pin holes or connecting pins for engaging with a slot socket of an application system; and
    another interface connecting device, exposing outward the casing, providing soldering joints to connect with the printed circuit board, having pin holes or connecting pins to engage with another interface slot socket.

11. The storage apparatus according to claim 10, wherein the another interface is a USB interface with an interface connecting device fixing to a USB signal end and the interface connector is the same

as the low height connecting device defined in claim 1.

12. The storage apparatus according to claim 10, wherein a read only switch or device is provided to expose externally.

13. The storage apparatus according to claim 10, wherein a signal light is mounted externally.

14. The storage apparatus according to claim 10, wherein a detachable cover guard is provided to fit with and protect the connector.

15. An electronic signal connecting device for being inserted into a USB slot socket, comprising

a printed circuit board, providing a circuit layout thereon;
a casing, providing a size for being associated with the printed circuit;
a set of metal lead wires, being laid and formed on the circuit board, and exposing outward the connecting device after the printed circuit board being associated with the casing;
whereby, a size and a height of the connecting device are compatible with an inner part of the USB slot socket so as to be capable of inserting into the USB slot socket.

16. The connecting device according to claim 15, wherein a set of jut pieces are fixedly attached to both lateral sides of the connector part for preventing the connecting device from being inserted into the slot socket in an incorrect direction.

17. The connecting device according to claim 15, wherein the metal lead wire part is composed of a set of parallel metal lead wires and the width of each of the lead wires and a clearance between any two adjacent ones of the lead wires are in accordance with the specification of USB interface terminal.

18. The connecting device according to claim 15, wherein an external recess is provided to reinforce an engaging strength thereof during being inserted into the standard USB interface.

19. A memory storage apparatus without interface connector, which can be inserted into a USB slot socket, comprising

a casing, receiving following electronic components, and having an opening;
a printed circuit board, providing a circuit layout with necessary lead wires and having a set of metal lead wire part exposing outward the casing;
a set of memory array, at least comprising a memory component for saving data;
a USB controller, changing data in the memory component into signal in accordance with a USB interface specification and changing the USB signal into the data so as be saved in the memory component, and connecting with the set of memory array to form a circuit loop.

20. The storage apparatus according to claim 19, wherein a connecting device same as the connecting device defined in claim 15 can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

21. The storage apparatus according to claim 19, wherein a read only switch or device is provided to expose externally to prevent data being written into the storage apparatus.

22. The storage apparatus according to claim 19, wherein a signal light is mounted externally for indicating a work status of read or write.

23. The storage apparatus according to claim 19, wherein a detachable cover guard is provided to fit with and protect the connector.

24. A dual interface memory storage apparatus without interface connector, which can be inserted into a USB slot socket, comprising

a casing, receiving following electronic components, and having an opening;
a printed circuit board, providing a circuit layout with necessary lead wires and having a set of metal lead wire part exposing outward the casing;
a set of memory array, at least comprising a memory component for saving data;
a dual interface controller, changing data in the memory component into signal in accordance with a USB interface specification and changing the USB signal into the data so as be saved in the memory component, and connecting with the set of memory array to form a circuit loop; and
a conventional interface connector or connecting device, being fixedly attached to the printed circuit board but being not compatible with the USB interface.

25. The storage apparatus according to claim 24, wherein a connecting device same as the connecting device defined in claim 15 can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

26. The storage apparatus according to claim 24, wherein a connector or connecting device same as an existing memory card interface connector or connecting device can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

27. The storage apparatus according to claim 24, wherein the existing memory card interface connector or connecting device is fixed to the printed circuit board and exposes outward the storage apparatus.

28. The storage apparatus according to claim 24, wherein a read only switch or device is provided to expose externally to prevent data being written into the storage apparatus.

29. The storage apparatus according to claim 24, wherein a signal light is mounted externally for indicating a work status of read or write.

30. The storage apparatus according to claim 24, wherein a detachable cover guard is provided to fit with and protect the USB interface signal contact end

31. An interface signal framework, comprising:

a power supply (V_{bus}), for offering a work voltage;
a signal group, further comprising a D+ and a D- signals;
a ground signal (Power GND); and
a device work signal group, offering a work signal, for indicating a work status of the device;

wherein, the D+ and D- signals are data signal in accordance with the standard USB interface specification and the device work signal group is offered by the device end and connects with a controller via a necessary circuit.

32. The interface signal framework according to claim 31, wherein the power supply offers a work voltage (V_{bus}) to support 5 volts, 3.3 volts, 2.5 volts and 1.8 volts.

33. The interface signal framework according to claim 31, wherein the device work signal further comprises a read/write or transmitting work signal for indicating a work status of the device.

34. The interface signal framework according to claim 31, wherein the device work signal group further comprises a power providing signal for indicating a status of power consumption.

Amended claims in accordance with Rule 86(2) EPC

1. A connecting device with low profile, comprising:

a connector part, having a height compatible with the distance between the receptacle contact and bottom of the USB connector slot which to be inserted; and
set of metal terminals, being arranged on the connector part, each terminal having a first end being disposed in the connector part and a second end extending outward the connector part;

whereby the first end of metal terminal assembly contacts with internal electronic signal of the standard USB interface slot socket and the respective second end is connected to a printed circuit board or a signal connecting lines.

2. The connecting device with low profile to claim 1, wherein a set of jut pieces are fixedly attached to both lateral sides of the connector part to preventing the connecting device from being inserted into the slot socket in an incorrect direction.

3. The connecting device with low profile according to claim 1, wherein said metal terminal assembly provides four independent and disconnecting gold contacts for connecting with the electronic signal.

4. The connecting device with low profile according to claim 1, wherein said connector part provides an external recess to reinforce an engaging strength thereof during being inserted into the standard USB interface.

5. A low profile USB interface memory storage apparatus, comprising:

a casing, receiving and bearing following components;
a printed circuit board, being arranged in the casing, providing a layout of lead wire circuit;
a memory array, at least comprising a memory component as a data storage apparatus;
a controller, being disposed in the casing, being provided with a layout of required circuit for completing transmission and transformation between USB interface signal and data signal and saving data into the memory array; and
an interface connector having the height compatible with the distance between the receptacle contact and bottom of the USB connector slot which to be inserted, which exposing outward the casing, providing a connecting joint to connect with the printed circuit board.

6. The storage apparatus according to claim 5,

wherein said interface connector is the low height connecting device defined in claim 1.

7. The storage apparatus according to claim 5, wherein said circuit is provided with a read only switch or device exposing externally.

8. The storage apparatus according to claim 5, wherein a signal light is mounted externally.

9. The storage apparatus according to claim 5, wherein a detachable cover guard is provided to fit with and protect the connector.

10. A memory storage apparatus with dual interface connecting devices, comprising:

a casing, receiving and bearing following components;
a printed circuit board, being disposed in the casing and having a circuit layout of lead wires;
a memory array, at least comprising a memory component and acting as data saving device;
a dual interface controller, changing data saved in an internal memory of being disposed in the casing being provided with a required circuit for completing transmission and transformation between USB interface signal and data signal and saving data into the memory array;
a first connecting device, exposing outward the casing, providing wires to connect with the printed circuit board, having an external pin holes or connecting pins for engaging with a slot socket of the first system; and
a second connecting device, exposing outward the casing, providing joints to connect with the printed circuit board, having pin holes or connecting pins to engage with the slot socket of the second system.

11. The storage apparatus according to claim 10, wherein the second connecting device is a USB interface with an interface connecting device fixing to a USB signal end and the interface connector is the low height connecting device defined in claim 1.

12. The storage apparatus according to claim 10, wherein a read only switch or device is provided to expose externally.

13. The storage apparatus according to claim 10, wherein a signal light is mounted externally.

14. The storage apparatus according to claim 10, wherein a detachable cover guard is provided to fit with and protect the connector.

15. An electronic signal connecting device for being inserted into a USB slot socket, or an interface socket which has a set of USB signals comprising

a printed circuit board, providing a USB signal circuit layout thereon;
a casing, providing a dimension for being associated with the printed circuit;
a set of metal lead wires, being laid and formed on the circuit board, and exposing outward the connecting device after the printed circuit board being associated with the casing;

characterized that the height of connecting device can compatible with the distance between the receptacle contact and bottom of the standard USB interface slot which to be inserted or same as the height of a non-USB standard socket which having a set of USB signals and can be inserted.

16. The connecting device according to claim 15, wherein a set of jut pieces are fixedly attached to both lateral sides of the connector part for preventing the connecting device from being inserted into the slot socket in an incorrect direction.

17. The connecting device according to claim 15, wherein the metal lead wire part is composed of a set of parallel metal lead wires and the width of each of the lead wires and a clearance between any two adjacent ones of the lead wires are in accordance with the specification of USB interface terminal.

18. The connecting device according to claim 15, wherein an external recess is provided to reinforce an engaging strength thereof during being inserted into the standard USB interface.

19. A memory storage apparatus without USB interface connector, which can be inserted into a USB slot socket or an interface socket which has a set of USB signals, comprising

a casing, receiving following electronic components, and having an opening;
a printed circuit board, providing a circuit layout with necessary lead wires and having a set of metal lead wire part exposing outward the casing;
a set of memory array, at least comprising a memory component for saving data;
a USB controller, changing data in the memory component into signal in accordance with a USB interface specification and changing the USB signal into the data so as be saved in the memory component, and connecting with the set of memory array to form a circuit.

20. The storage apparatus according to claim 19,

wherein the connecting structure of USB interface is same as the connecting device defined in claim 15 can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

21. The storage apparatus according to claim 19, wherein a read only switch or device is provided to expose externally to prevent data being written into the storage apparatus.

22. The storage apparatus according to claim 19, wherein a signal light is mounted externally for indicating a work status of read or write.

23. The storage apparatus according to claim 19, wherein a detachable cover guard is provided to fit with and protect the connector.

24. A dual interface memory storage apparatus without USB interface connector, which can be connected with the receptacle contact of USB socket or an interface socket which has a set of USB signals, comprising:

a casing, receiving following electronic components, and having an opening;
a printed circuit board, providing a circuit layout with necessary lead wires and having a set of metal lead wire part exposing outward the casing;
a set of memory array, at least comprising a memory component for saving data;
a dual interface controller, changing data in the memory component into signal in accordance with a USB interface specification and changing the USB signal into the data so as be saved in the memory component, and
connecting with the set of memory array to form a circuit; and
a set of connecting devices, which other than USB connector.

25. The storage apparatus according to claim 24, wherein one of the connecting devices same as the connecting device defined in claim 15 can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

26. The storage apparatus according to claim 24, wherein a connector or connecting device same as an existing memory card interface connector or connecting device can be formed with the metal lead wire part as soon as the casing is associated with the printed circuit board.

27. The storage apparatus according to claim 24, wherein a connector or connecting device same as an existing memory card is fixed to the printed circuit board and exposes outward the storage apparatus.

28. The storage apparatus according to claim 24, wherein a read only switch or device is provided to expose externally to prevent data being written into the storage apparatus.

29. The storage apparatus according to claim 24, wherein a signal light is mounted externally for indicating a work status of read or write.

30. The storage apparatus according to claim 24, wherein a detachable cover guard is provided to fit with and protect the USB interface signal contact end

31. An interface signal framework, comprising:

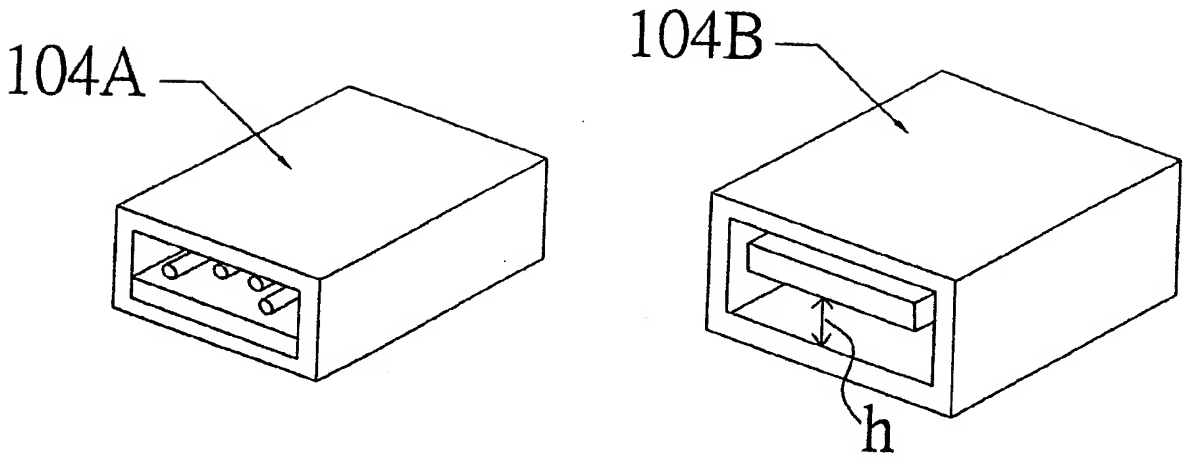
a power supply (V_{bus}), for offering a work voltage;
a signal group, further comprising a D+ and a D- signals;
a ground signal (Power GND); and
a device work signal group, for indicating the working status of the device;

wherein, the D+ and D- signals are data signal in accordance with the standard USB interface specification and the device work signal group is connected with a controller via a necessary circuit.

32. The interface signal framework according to claim 31, wherein the power supply offers a work voltage (V_{bus}) to support 5 volts, 3.3 volts, 2.5 volts or 1.8 volts.

33. The interface signal framework according to claim 31, wherein the device work signal further comprises a read/write or transmitting work signal for indicating a work status of the device.

34. The interface signal framework according to claim 31, wherein the device work signal group further comprises a power which providing signal for indicating a status of power consumption.



(PRIOR ART)

FIG. 1

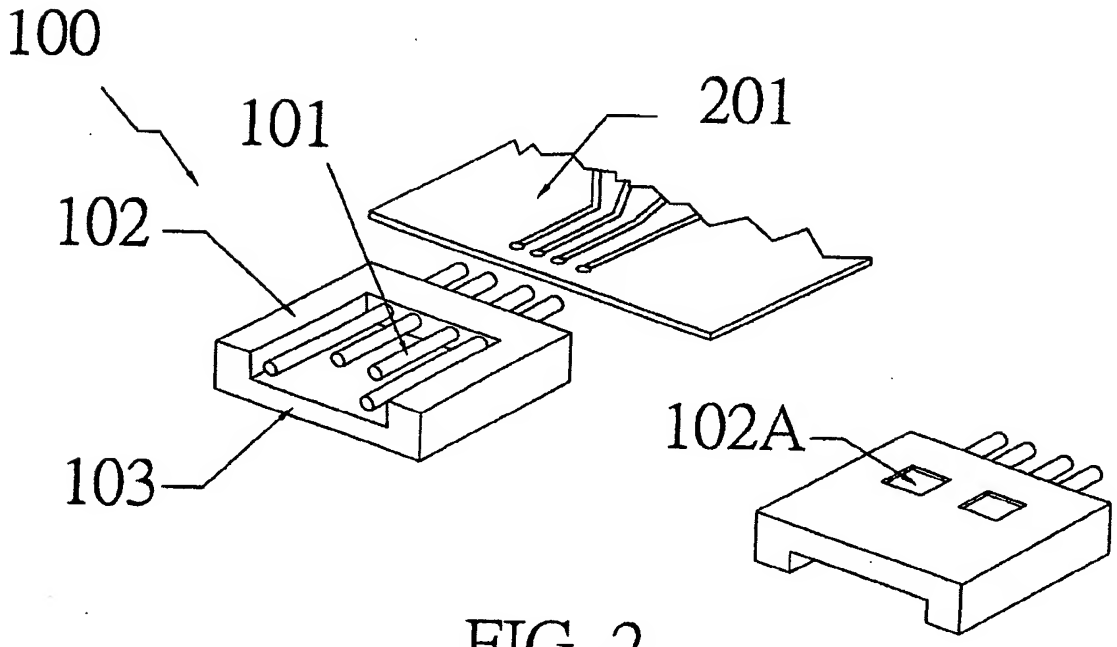


FIG. 2

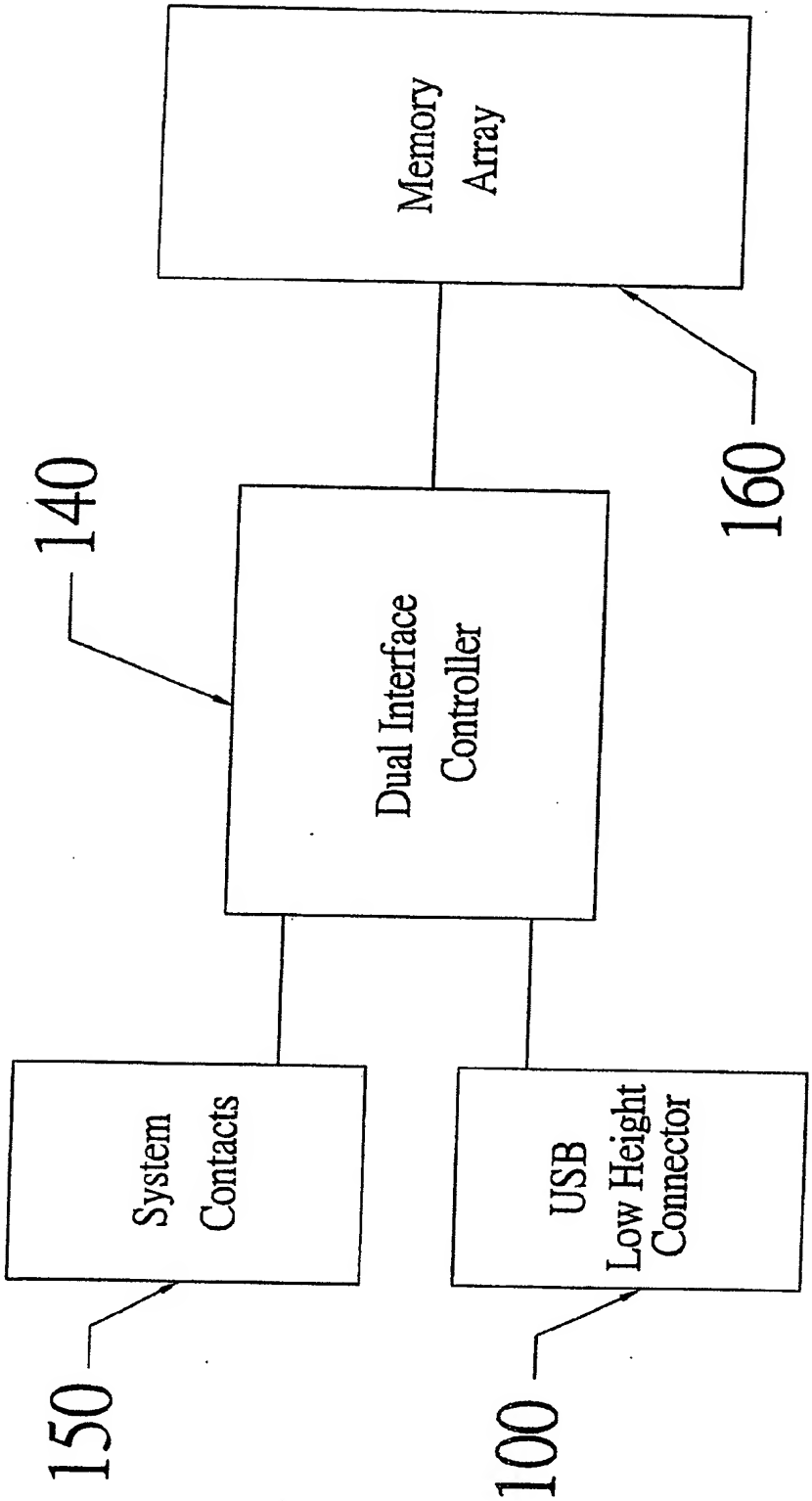

Memory Array
160
140
Dual Interface Controller
System Contacts
USB Low Height Connector
150
100

FIG. 3

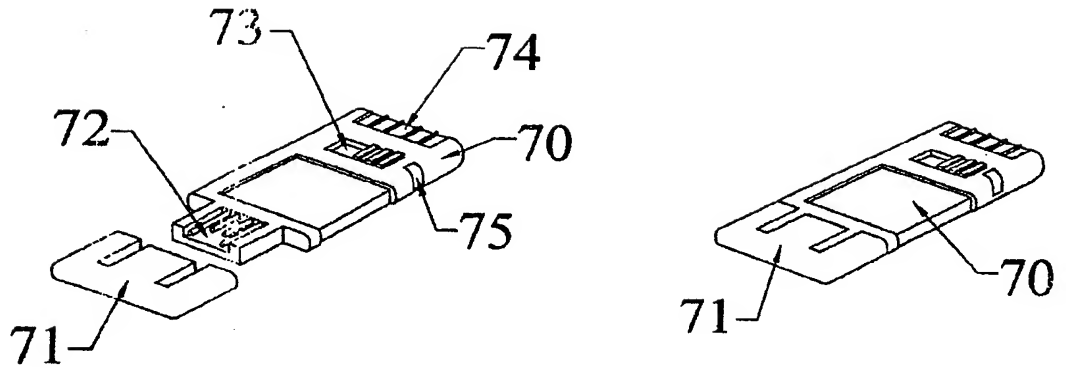


FIG. 4

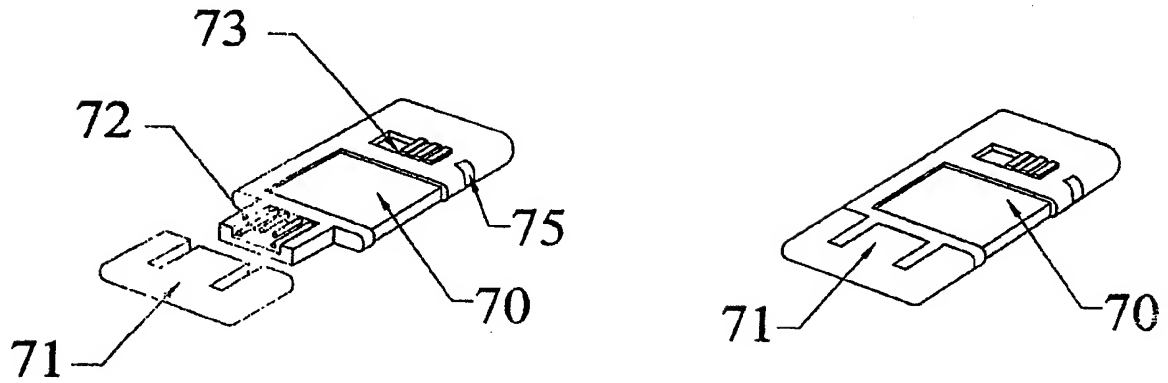


FIG. 5

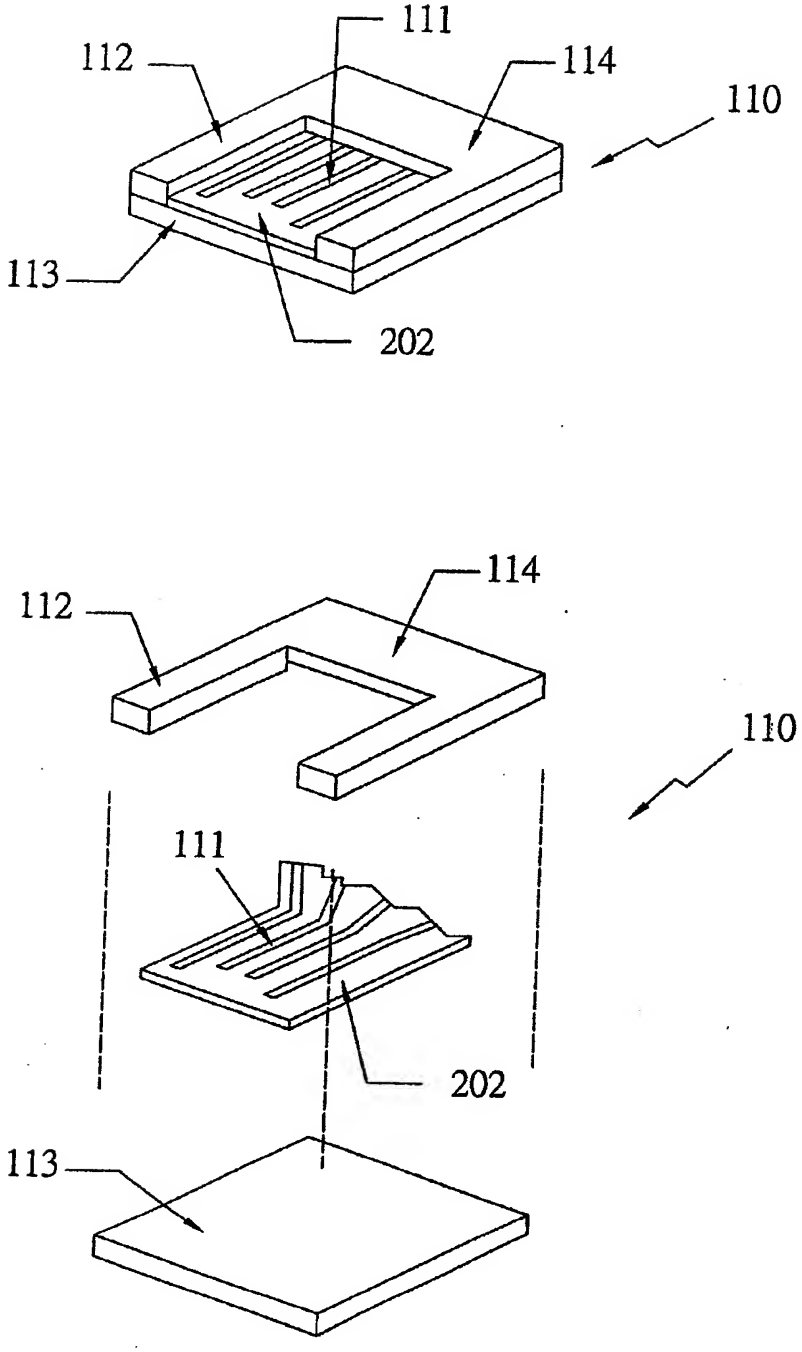


FIG. 6

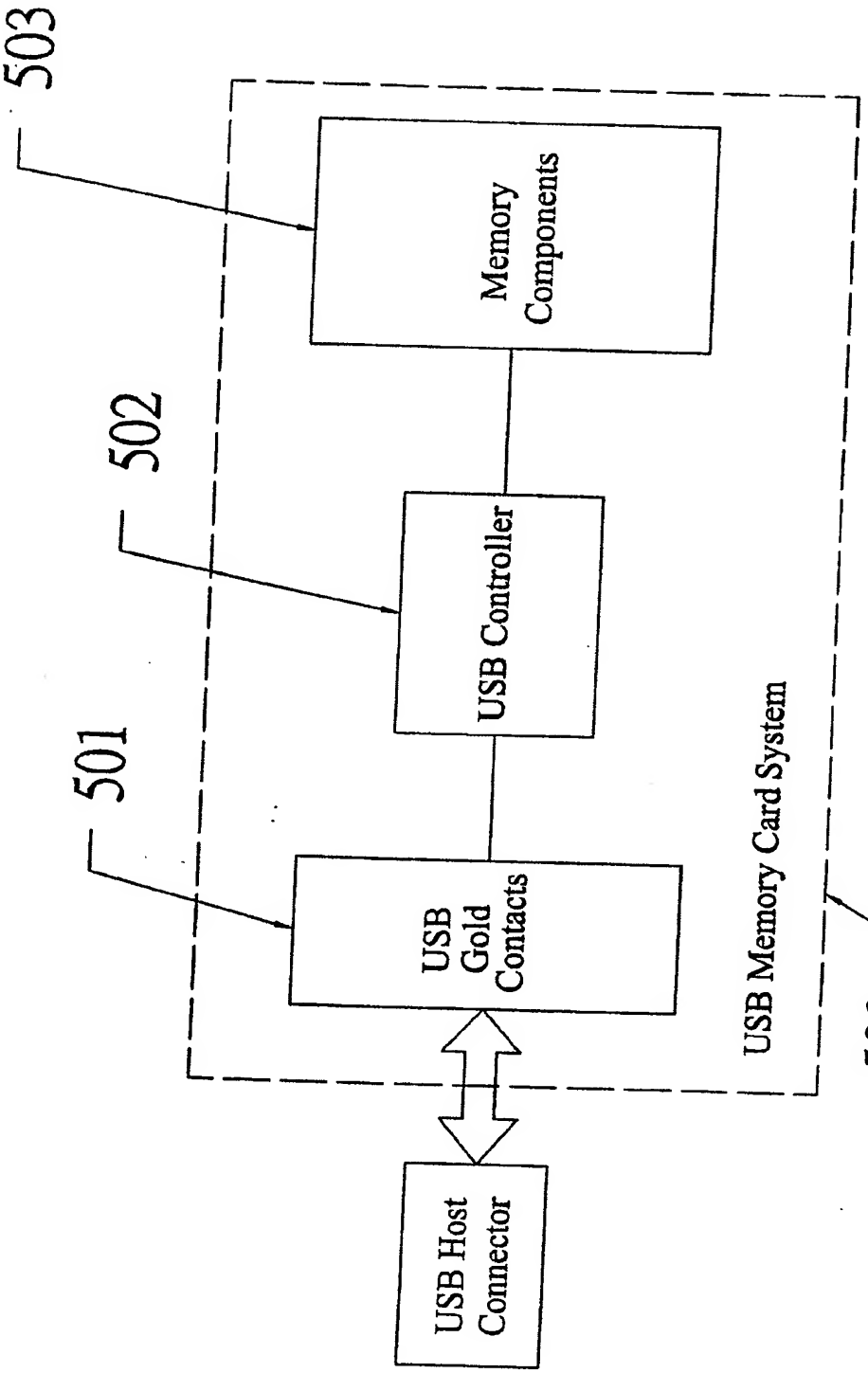


FIG. 7

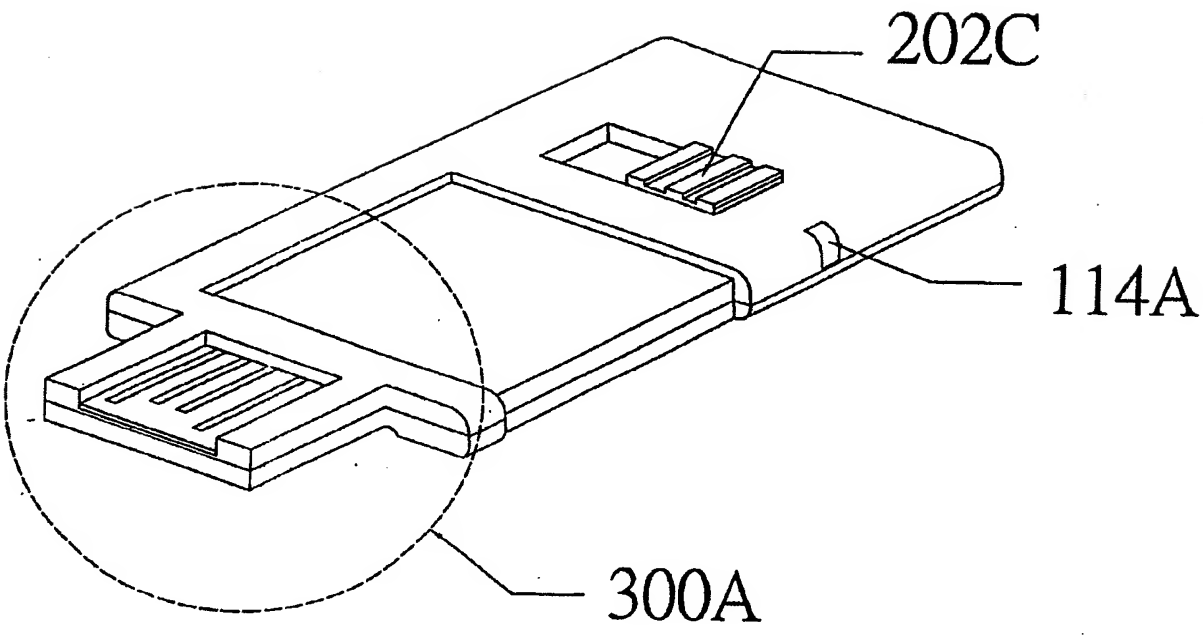


FIG. 8

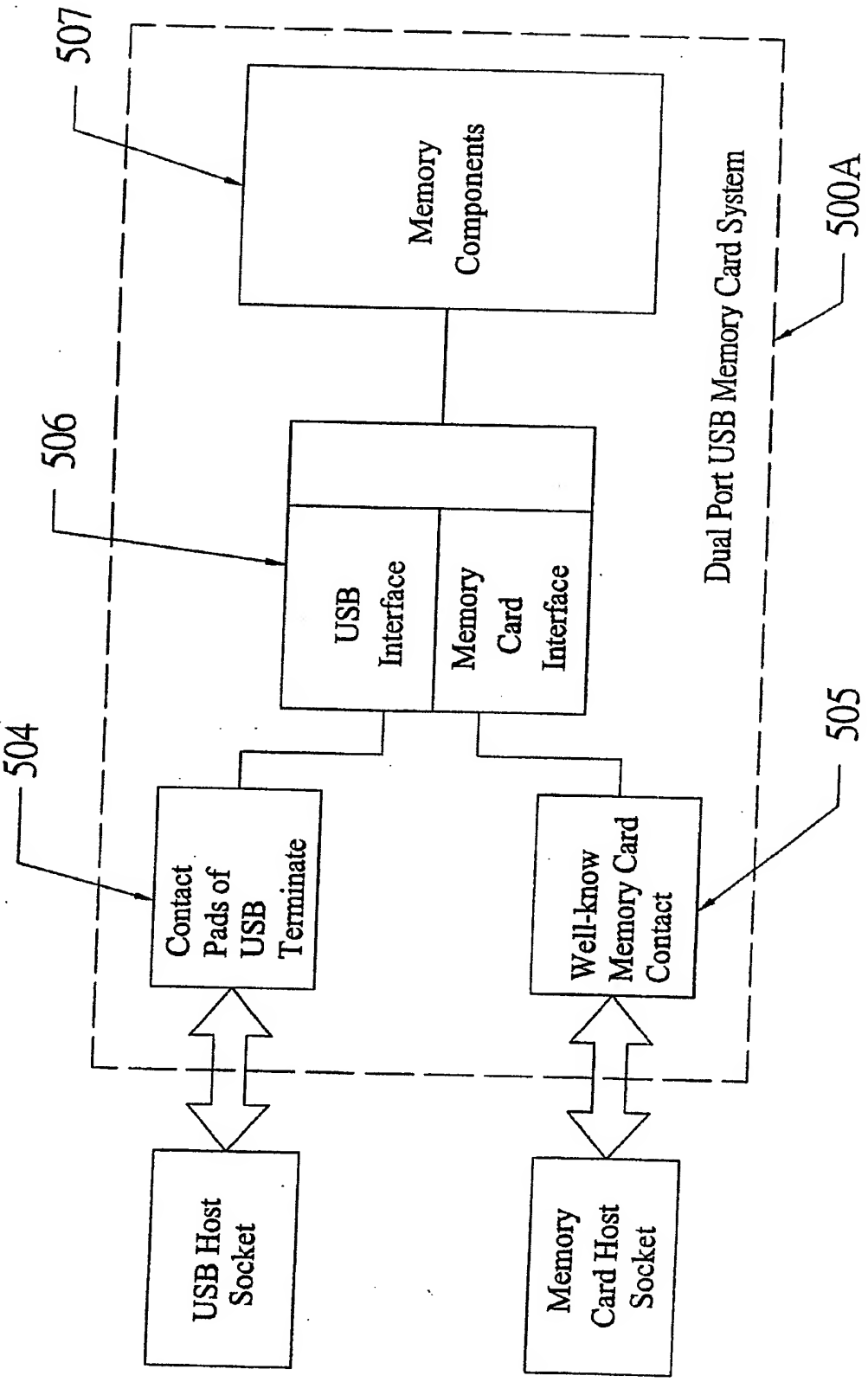


FIG. 9

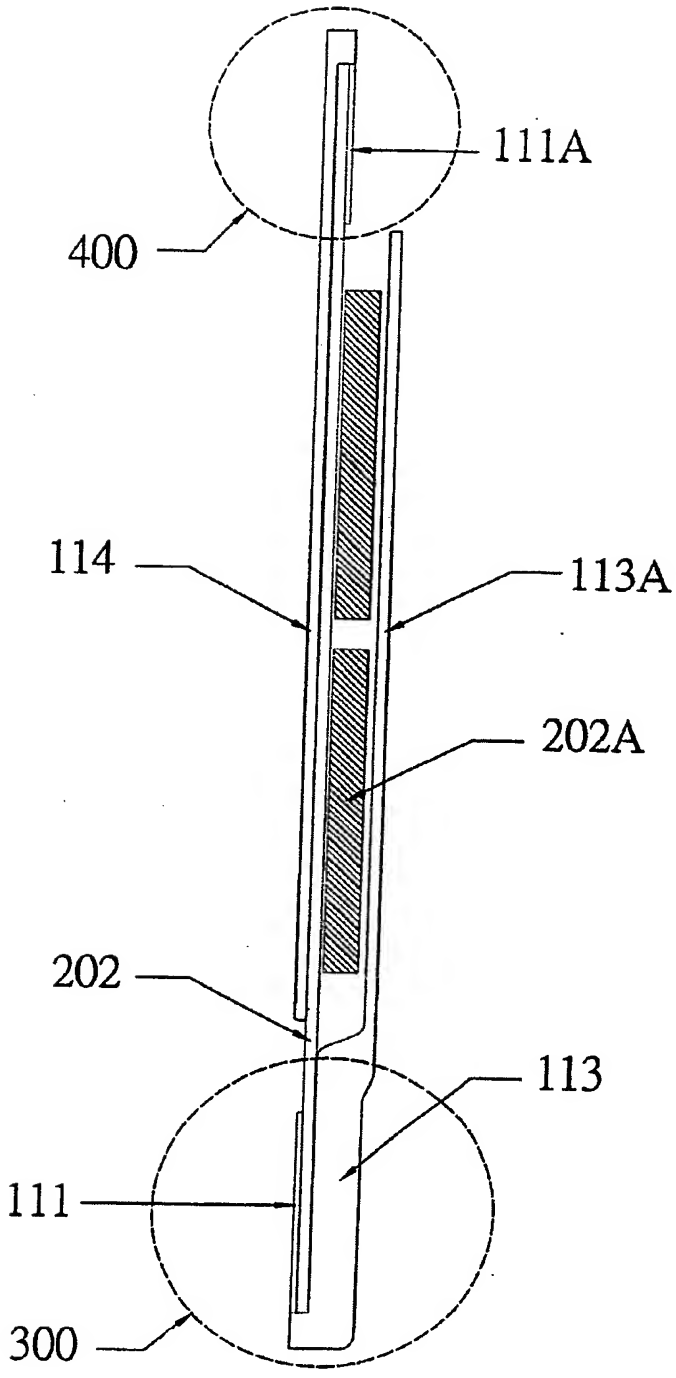


FIG. 10

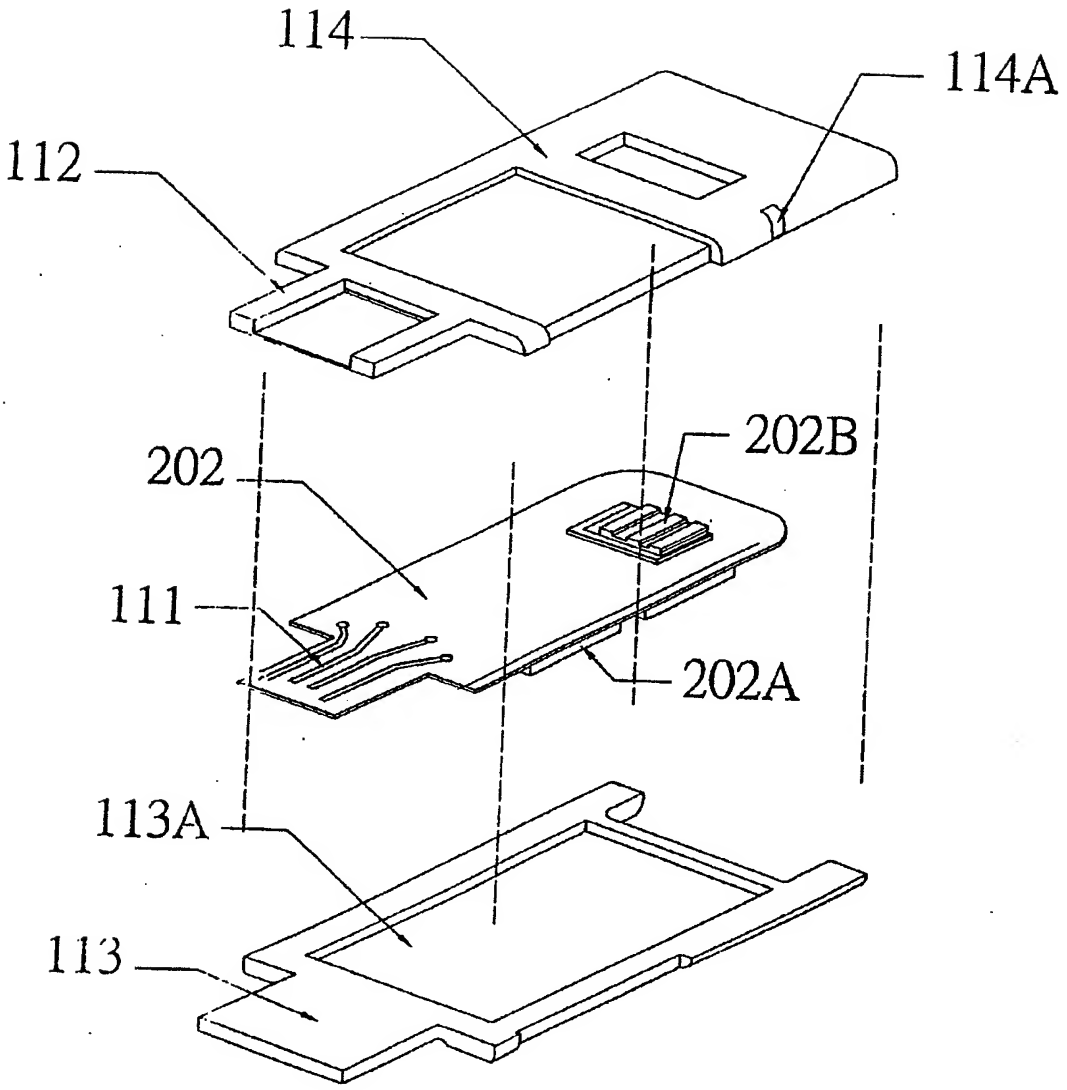


FIG. 11

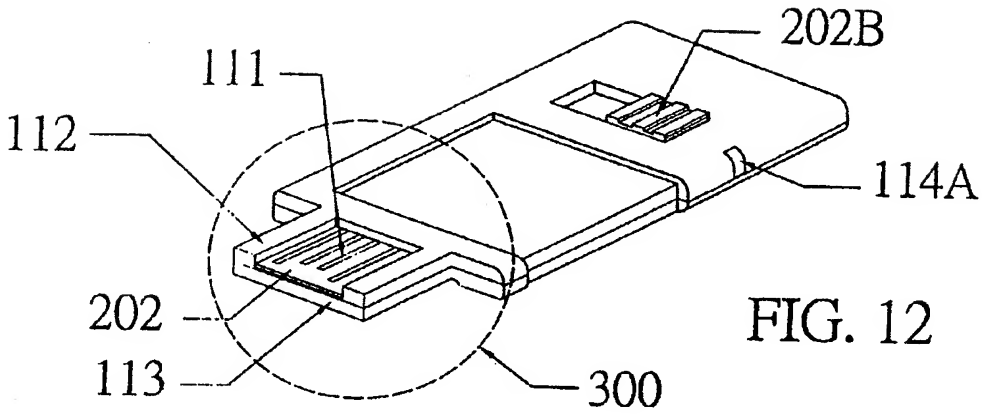


FIG. 12

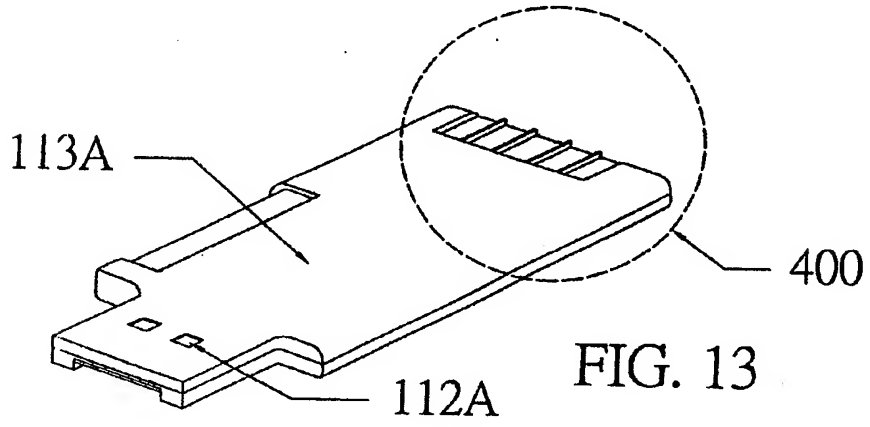


FIG. 13

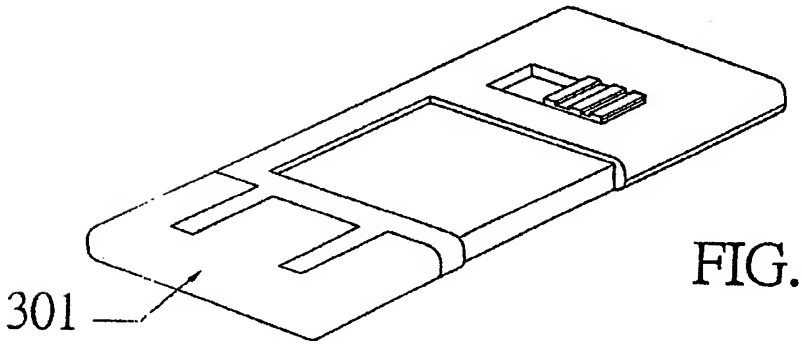


FIG. 14

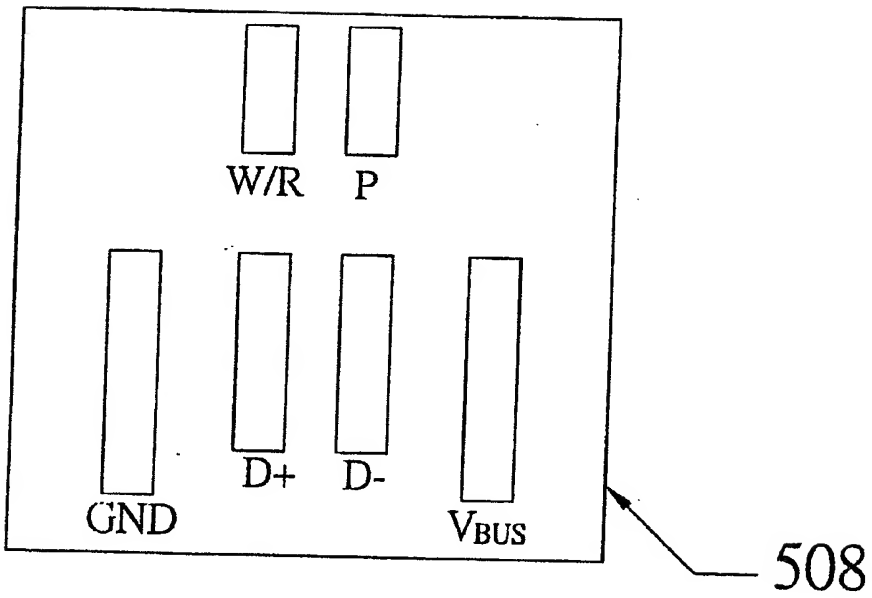


FIG. 15

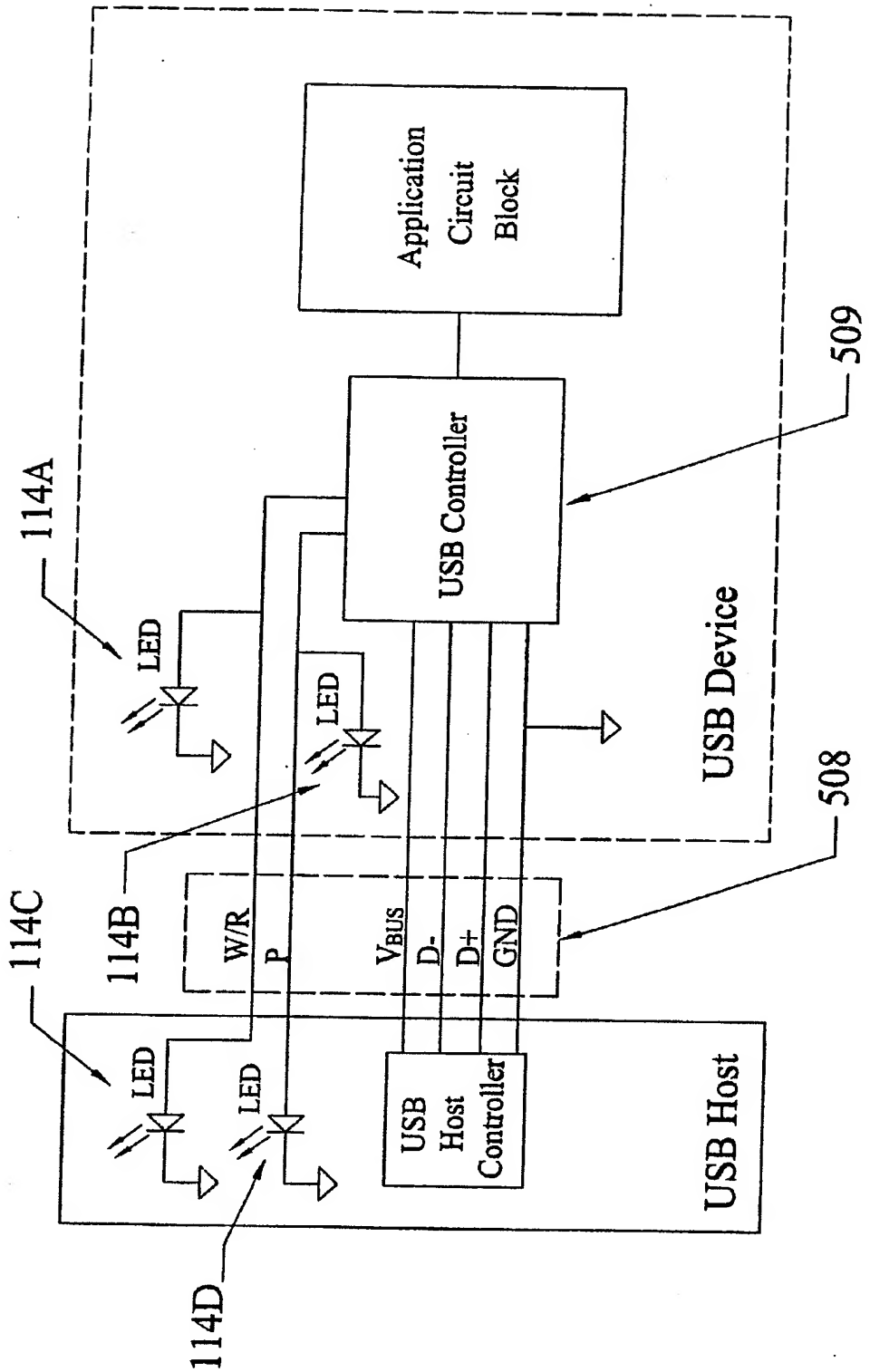

Application Circuit Block
USB Controller
509
USB Device
114A
LED
LED
114B
508
W/R
P
VBUS
D-
D+
GND
114C
LED
LED
USB Host Controller
USB Host
114D

FIG. 16

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 2319

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 086 430 A (BROOKIE TIMOTHY SCOTT ET AL) 11 July 2000 (2000-07-11) * column 3, line 64 - column 5, line 27; figure 13 *	1,5,10, 15,19, 24,31	H01R12/08 H01R13/645
X	US 6 334 793 B1 (BROOKIE TIMOTHY SCOTT ET AL) 1 January 2002 (2002-01-01) * column 4, line 32 - column 5, line 35; figure 9 *	1,5,10, 15,19, 24,31	
A	US 5 658 170 A (CHANG TIM S L ET AL) 19 August 1997 (1997-08-19) * column 2, line 34 - column 4, line 50; figure 2 *	1-34	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	12 August 2002	Stirn, J-P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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